Bus Testing and Research Center in Altoona. This center may also be doing more extensive testing of transit buses in the future, which could lead to an additional source of information. Also, some agencies have looked outside of the transit industry to the heavy-duty automotive and the truck industry, such as the Technology and Maintenance Council of the American Trucking Association, for information on flat rate manuals.

Developing Standards

There are a variety of methods that public transit agencies have used to implement productivity standards. A few transit agencies have the capabilities to use formalized IE procedures to establish their own SRT. One engine manufacturer's SRT are developed by determining repair times for each step of the procedure and totaling these times to complete a quality repair (*3*). Metro Transit of King County, Washington, modified the formalized IE process by using a sampling method whereby various mechanics were monitored following a detailed job description and various related activities. The standard time was calculated as the average of the sampling.

Some agencies rely on manipulations of their own historical information to set standards. A few have used other agencies' information and procedures and then adapted them to their own operating requirements. Figure 3 shows a sample page from a Milwaukee County Transit System (MCTS) Process Sheet, which is posted on the TRB AP035 (was A1E16) Transit Fleet Maintenance WebBoard and can be downloaded and then modified to meet individual transit agency requirements.

03/24/2003

MILWAUKEE COUNTY TRANSIT SYSTEM
Maintenance Department Process Sheet

DESCRIPTION: Starter Remove & Replace **COACH:** New Flyer

DIVISION: All Locations **WORK CODE:** 1809 D **TIME STANDARD:** 1.0 Hr

PARTS AS REQUIRED:

Starter 4000 - 4145	#090-09-004	Starter Gasket	#158-34-003
Starter 4200 - 4750	#090-12-001		

SAFETY CAUTIONS:

Engine temperature should be less than 130 degrees. Always shift battery disconnect switch to the "off" position to avoid injury from accidental engine starting while servicing. When starting engine be sure that transmission lever is in the"Neutral" position and hand brake is set.

QUALITY CHECKS:

Start engine to check function and for fluid leaks. Torque values: mounting nuts: 181-226 ft. lbs, small connections: 16-30 ft. lbs, larger connections: 20-25 ft. lbs.

STEP BY STEP METHOD:

1.) Shift battery disconnect switch to "off" position.
2.) Disconnect power cable and ground cable from starter.
3.) Disconnect all wires from solenoid.
4.) Support starter and remove the (3) bolts which secure it to the flywheel housing.
5.) Remove starter and set aside. Fill out and attach unit exchange tag to starter.
6.) Get rebuilt starter and new gasket.
7.) Scrape old gasket material off of starter mounting surface. Place new gasket over (3) studs, spray with "Copper-Coat" to prevent slipping.
8.) Support starter and install the (3) bolts that secure it to the flywheel housing. Caution: Be careful not to tear or dislodge new gasket.
9.) Connect all wires to solenoid. Connect power cable and ground cable to starter.
10.) Torque the (3) mounting bolts to 181-226 ft. lbs. Torque the small connections to 16-30 ft. lbs. Torque the larger connections to 20-25 ft. lbs.
11.) Shift battery disconnect switch to "on" position.
12.) Start engine to confirm function.

CAUTION: Check for transmission fluid leaking past gasket with engine running. Will only happen if gasket had been torn or old gasket material was not scrapped off clean enough.

13.) Close all hatches. Return coach to service. Clean up area. Report to supervisor for next assignment. Punch off work code 1809 D.

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FIGURE 3 Sample of an MCTS process document with time standard.